1992

G92-1106 Controlling Rats

Scott E. Hygnstrom
University of Nebraska-Lincoln, shygnstrom1@unl.edu

Dallas R. Virchow
University of Nebraska-Lincoln

G92-1106-A

NebGuide

Published by Cooperative Extension, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln

Controlling Rats

Ways to recognize rat problems and control rats are covered here.

Scott E. Hygnstrom, Extension Wildlife Damage Specialist
Dallas R. Virchow, Extension Assistant, Wildlife Damage

The Norway rat (*Rattus norvegicus*) (also known as the common brown rat) is a destructive pest. Found in and around towns and farms throughout Nebraska, these rodents eat and contaminate large amounts of feed, damage structures by their gnawing and burrowing, and spread diseases that affect livestock and humans.

Recognizing Rat Infestations

Rats can be detected by their droppings or evidence of fresh gnawing. Tracks can be seen in mud and on dusty surfaces. Burrows and runways may be found next to buildings, along fences, and under low vegetation and debris.

Rat Facts

Norway rats are robust rodents that usually weigh about 11 ounces. Adults are 13 to 18 inches long, including a 6- to 9-inch tail. Their fur is coarse, brownish and scattered with black hair on the upper surfaces. The belly fur is typically gray to yellowish-white, and they sport a naked, scaly tail.

Norway rat, *rattus norvegicus*

Rats will eat nearly anything, but they prefer high-quality foods such as fresh grain, livestock feed, and meat. Rats require 1 fluid ounce of water daily when feeding on dry food.

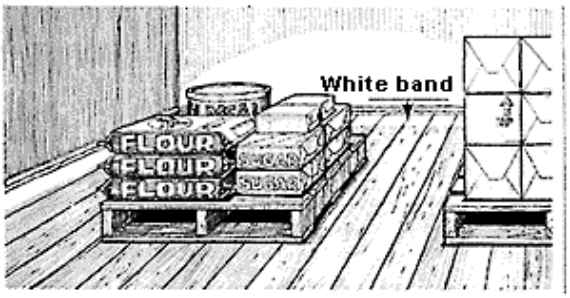
Rats have keen senses of hearing, smell, taste and touch. They will climb to find food or shelter, and can gain entrance to a building through any opening larger than 1/2 inch in diameter.

Rats have litters of six to 12 young, which are born 21 to 23 days after mating. Young rats are sexually mature in about three months. Breeding occurs mostly in spring and fall. The average female has four to six litters per year. Individuals usually live 12 to 18 months.

Rat Control

Sanitation. The presence of garbage and other refuse allows rats to exist in residential areas. Good sanitation will not eliminate rats under all conditions, but will make the environment less suitable for them to thrive. This involves proper storage and handling of food materials and refuse, and elimination of rodent shelter.

Figure 1. A 12-inch (30 cm) white painted band makes inspection for rodent sign easier and reminds personnel to practice good sanitation.



It is difficult to remove all food rats can use on farms where food grains are handled and stored, or where livestock are housed and fed. In such situations, you can still remove the shelter rats use for hiding, resting and nesting.

Warehouses, grain mills, elevators, silos and corn cribs are especially vulnerable to rodent infestation. Store bulk foods in rodent-proof buildings, rooms, or containers whenever possible. Stack packaged food on pallets with adequate space left around and under stored articles to allow inspection for rat sign (*Figure 1*).

Rodent-proof construction. The most successful and permanent form of rat control is to "build them out" by eliminating their access to structures. Ideally, all places where food is stored, processed or used should be rodent-proof.

Seal any openings larger than 1/4 inch to exclude both rats and mice. Openings where utilities enter buildings should be sealed tightly with metal or concrete. Wood, plaster and caulk will not keep rats out. Equip floor drains and sewer pipes with tight-fitting grates that have openings less than 1/4 inch in diameter. Doors, windows and screens should fit tightly. It may be necessary to cover edges with sheet metal to prevent gnawing. For more information, refer to NebGuide *G94-1217, Rodent-Proof Construction: Drains and Feeding Equipment*.

Rodenticides. Single-dose and multiple-dose rodenticides (toxic baits) and fumigants are registered for rat control. A wide variety of active ingredients and formulations are available. We recommend you use commercially-prepared materials, because they do not require applicators to handle concentrated materials that are more hazardous.

Single-dose rodenticides. Single-dose rodenticides are more hazardous than the multiple-dose (anticoagulant) rodenticides. Therefore, single dose toxicants should be used by professional pest control operators or other persons familiar with their use. Single-dose rodenticides (*Table I*) will give a quick knockdown of a rat population. They may be preferred where rats are abundant or where it is difficult to get rats to accept a bait for several days in succession because of competing food items.

Bait acceptance can be increased by "prebaiting" with unpoisoned bait for several days before the rodenticide is offered. If acceptance of prebait is poor, do not apply toxic bait, but change bait material or its placement. "Bait shyness" can occur with some single-dose rodenticides such as zinc phosphide, so it is best to use them only once per year at any location.

Remove and destroy all uneaten bait at the end of a poisoning program. Never leave single-dose baits exposed for more than three to four days.

Table I. Single-dose rodenticides and the percent of active ingredient commonly used for rat control.		
Common name	**Chemical name**	**Percent active ingredient used in food bait**
Bromethalin (Assault®,Trounce®)	N-methyl-2,4-dinitro-N-(2,4,6-tribromophenyl)-6-trifluoromethyl)benzenamine	0.005 - 0.01
Cholecalciferol, Vitamin D_3(Quintox®, Rampage®)	9,10-Seocholesta-5,7,10(19)-trein-3-betaol	0.075
Zinc phosphide (ZP®)	zinc phosphide	1.0 - 2.0

Multiple-dose (anticoagulant) rodenticides. Multiple-dose rodenticides (*Table II*) generally are considered much safer than single-dose rodenticides. Anticoagulants cause death as a result of internal bleeding, which occurs as the animal's blood loses the ability to clot and capillaries are damaged. The active ingredients are used at very low levels, so bait shyness does not occur when using properly formulated baits.

Rats must feed on most anticoagulant baits for several days before death will occur. Fresh bait must be made available to rats continuously for at least two weeks, or as long as feeding occurs. There are exceptions, however, such as brodifacoum and bromadiolone, that are capable of causing death after a single feeding, but the rats do not die for several days. Vitamin K is an antidote for several anticoagulant rodenticides.

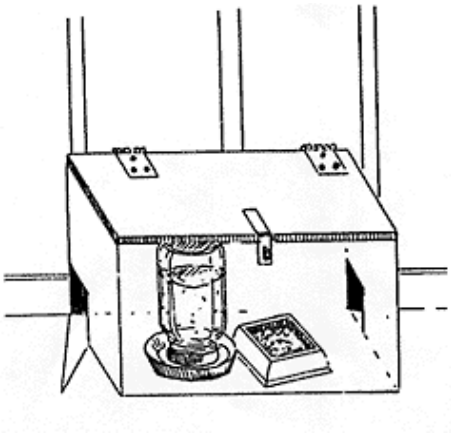


Figure 2. A homemade rodent bait station can contain liquid as well as solid (cereal) baits.

Bait selection and placement. Several types of anticoagulant baits are available. Grain baits or pelleted forms often are purchased in bulk or packaged in small plastic, cellophane or paper packets. These "place packs" keep baits fresh and make it easy to place baits into burrows, walls, or other locations. Rats readily will gnaw into place packs and feed on baits.

Anticoagulant baits formed into paraffin blocks are useful in damp locations such as sewers or gutters, where loose grain baits spoil quickly. Unfortunately, they are not accepted by rats as readily as other baits.

Anticoagulants also are available as sodium salts that are mixed into a water solution. Since rats require water daily, they sometimes can be drawn to water stations. Water baits are particularly effective in grain storage structures, warehouses and other locations where water is scarce.

Table II. Multiple-dose (anticoagulant) rodenticides and the percent active ingredient usually found in food baits for rat control.		
Common name	**Chemical name**	**Percent active ingredient used in food bait**
Brodifacoum (Havoc®, Talon-G®)	3-{3-[4'-bromo(1,1'-biphenyl)-4-yl]-1,2,3,4-tetrahydro-1-naphthalenyl}-4-hydroxy-2H-1-benzopyran-2-one	0.005
Bromadiolone (Maki®, Contrac®)	3-{3-[4'-bromo(1,1'-biphenyl)-4-yl]-3-hydroxy-1-phenylpropyl}-4-hydroxy-2H-1-benzopyran-2-one	0.005

Chlorophacinone (RoZol®, AC 90)	2-{(p-chlorophenyl)phenylacetyl}-1,3-indandione	0.005
Diphacinone (Ramik®, Bait Blocks®)	2-diphenylacetyl-1,3-indandione	0.005
Pivalyl, Pindone (Pival®, Pivalyn®)	2-pivalyl-1,3-indandione	0.025
Warfarin (d-Con®)	3-(a-acetonylbenzyl)-4-hydroxycoumarin	0.025
Warfarin + sulfaquinoxaline (Proline®)	3-(a-acetonylbenzyl)-4-hydroxycoumarin + quinoxalinyl sulfanilamide	0.025

We highly recommend the use of bait stations when applying any toxic bait (*Figures 2, 3*). They protect rodenticides from weather and provide a safeguard to people, pets and other animals. Rat bait stations should have at least two openings about 2 1/2 inches in diameter and should be large enough to accommodate several rats at a time. Place bait boxes next to the walls (with the opening close to the wall) or in other places where rats are active. Label all bait boxes clearly with the words "Caution -- Rat Bait" as a safety precaution.

Establish bait stations in or around the perimeters of buildings where it is impossible to exclude rodents. Place fresh anticoagulant bait in these stations to control invading rats before breeding populations become established. For more information, refer to NebGuide *G94-1215, Bait Stations for Controlling Rats and Mice*.

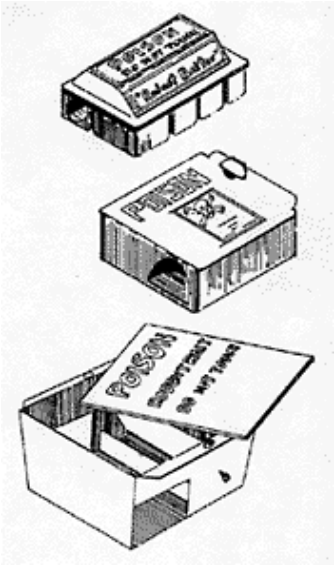


Figure 3. Examples of commercially manufactured rodent bait stations.

Fumigants. Fumigants occasionally are used to treat rodents' burrows in outdoor situations. Aluminum phosphide tablets and gas cartridges are the most commonly used, registered fumigants for treating rat burrows.

Caution: Fumigants are highly toxic to humans, livestock and other animals, and must not be used where occupants of a building could be exposed to the gases. Only licensed structural pest control operators should use fumigants in any buildings or enclosed structures.

Safety precautions. Carefully follow all product label recommendations. In addition, certain general safety precautions should be followed. Consider all rodenticides dangerous enough to cause death, and place baits where only rodents can access them. All rodenticides present some degree of hazard to humans, livestock, pets and other non-target animals.

People who formulate rodent baits for their own use should use extreme care in handling materials. Rubber gloves, an apron and a proper respirator should be worn. Wash thoroughly using soap, a brush and plenty of water after preparing baits. Clean all bait-mixing utensils thoroughly and use them only for bait preparation.

Label all bait containers and bait stations clearly with appropriate warnings. Store unused bait, concentrates, and fumigants in a locked cabinet out of the reach of children or animals. Pick up all accessible dead rats after a poisoning program. Use rubber gloves or tongs and dispose of them by deep burial or incineration.

Traps. Trapping can be an effective method of controlling rats, but it requires more skill and labor than most other methods. Trapping is recommended where toxicants are inappropriate. It is best to try trapping first in homes, garages, and other small structures where there may be only a few rats present. Trapping has several advantages: 1) it does not rely on inherently hazardous rodenticides; 2) it permits the user to view his or her success; and 3) it allows for disposal of trapped rats, thereby eliminating odor problems which may occur when poisoning is done within buildings.

Simple, inexpensive wood-based snap traps are available at most hardware and farm supply stores. Wire cage traps are more expensive but somewhat more successful than snap traps.

Bait traps with peanut butter or a small piece of hot dog, bacon or pizza tied securely to the trigger. The trigger should be set lightly so the trap will spring easily. Leave traps unset until the bait has been taken at least once to reduce the chance of rats becoming trap-shy. Set traps close to walls, behind objects, in dark corners and in places where rat sign or activity is observed. Place traps so rats will pass directly over the trigger when following their natural course of travel. Use enough traps to make the effort short and decisive.

An alternative to traps are glue boards, which catch and hold rats attempting to cross them in much the same way flypaper catches flies. Place glue boards along walls or in other areas where rats travel. Do not use them where children, livestock, pets or desirable wildlife can contact them. Glue boards lose their effectiveness in dusty areas unless covered. Extreme temperatures also may affect the tackiness of the glue boards.

Electronic devices. Rats quickly become accustomed to regularly repeated sounds. Ultrasonic sounds, those above the range of human hearing, have very limited use because they are directional and do not penetrate behind objects. They also lose their intensity quickly with distance. There is little evidence that electronic, sound, magnetic, or vibration devices of any kind will drive established rats from buildings or provide adequate control.

Predators. Although house cats, some dogs, and other predators kill rats, they do not provide effective rat control in most circumstances. Rats often live in very close association with dogs and cats. Rat problems around homes are often related to the food, water and shelter provided for the pet.

To simplify information, trade names of some products have been used in the text and tables. No endorsement of named products is intended, nor is criticism implied of similar products that are not mentioned.

If mouse control is also a problem, see *NebGuide G92-1105, Controlling House Mice*.

Acknowledgements *-- Much of this information was drawn from the previous NebGuide, Controlling Rats, by Robert M. Timm. Diane K. Gronewold, Dale J. Hafer, and Diana J. Smith provided technical assistance.*

File G1106 under: WILDLIFE MANAGEMENT
A-20, Wildlife Damage Control
Issued August 1992; 10,000 printed.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Elbert C. Dickey, Director of Cooperative Extension, University of Nebraska, Institute of Agriculture and Natural Resources.